

Wild Potato's Genes May Blunt Late Blight

What's a potato's number-one enemy?

Anywhere on our planet the likely answer is: late blight. But tomorrow's tubers may be safeguarded against this disease, thanks to research by ARS scientists from coast to coast. The researchers intend to develop hardy, highly productive potato plants that not only produce top-quality potatoes but also shrug off attack by *Phytophthora infestans*, the fungus-like microbe that causes late blight. The disease, which led to the Irish potato famine of the 1840s, costs about \$400 million in losses each year in the United States, where potatoes are our favorite veggie.

An ARS team at the Western Regional Research Center in Albany, California, has found and copied a gene that may work in concert with other genes to fend off late blight.

They've named the gene *Sbul*, for *Solanum bulbocastenum*, a late-blight-resistant species of wild potato that grows in Mexico.

This discovery followed up on pioneering research over the past decade by plant physiologist John P. Helgeson, formerly with ARS in Madison, Wisconsin. He fused *S. bulbocastenum* with the familiar domesticated potato, *S. tuberosum*, creating unique hybrids that he offered to researchers such as pathologist Dennis L. Corsini and geneticist Joseph J. Pavek.

Corsini and Pavek, then with ARS in Idaho and now retired, crossed the Wisconsin hybrids with other potatoes, then provided samples—varying in their resistance to late blight—to other

investigators. Each cross had lessened the amount of genetic material from the wild potato. This narrowed the California team's search for the resistance gene and proved faster than trying to tease out the gene directly from the wild potato.

Plant molecular biologist Teruko Oosumi, working with a group led by ARS plant physiologist William R. Belknap at Albany, isolated and cloned the *Sbull* gene from one of the Aberdeen hybrids. Then, Belknap, microbiologist David R. Rockhold, and plant molecular biologist Malendia Maccree moved the gene into domesticated *S. tuberosum* potatoes for tests in the specialized greenhouses of plant pathologist Kenneth L. Deahl in Beltsville, Maryland.

The California group also determined the blueprint, or structure, of the *Sbull* gene and pinned down its location within the wild potato's genome. To do that, Belknap used a portable, compact "library" of all the genes in *S. bulbocastenum*, provided by Jiming Jiang, professor of horticulture at the University of Wisconsin, Madison.

In Deahl's greenhouse research, the test tubers from Albany that had the

newly added *Sbull* gene showed resistance to the disease. Now, additional tests, conducted in Michigan by David Douches, plant and soil sciences professor at Michigan State University, East Lansing, will reveal how well *Sbull*-equipped potatoes perform outdoors when exposed to the microbe. These field experiments should bring scientists a step closer to determining whether genes from a wild, south-of-the-border potato can protect its northern cousins from being battered by late blight.—By **Marcia Wood, ARS.**

This research is part of Plant, Microbial, and Insect Genetic Resources, Genomics, and Genetic Improvement, an ARS National Program (#301) described on the World Wide Web at www.nps.ars.usda.gov.

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Potatoes infected with late blight are shrunk on the outside, corky and rotted inside.

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